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Pipeline & Cable Locator

TY-2000A

User Manual

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Chapter One

Outline

1.1 Thrive Industry Pipeline & Cable Locator TY-2000A

The Pipeline & Cable Locator consists of a Transmitter and a Receiver, used in the underground utilities route locating, the depth measuring and long distance tracing. We adopted multicoil electromagnetism technology on the Pipeline & Cable Locator, enhanced the pipeline localization to decide the depth precision and the goal pipeline recognition capability, also could accurately carry on tracing and the localization in the pipeline crowded complex region to the goal pipeline. The Pipeline & Cable Locator is widely used in the telecommunication, electric, water supply, natural gas, physical prospecting, town planning etc.

The Pipeline & Cable Locator has many optional accessories, thus increased their use, and expanded their application scope.

Before use Thrive Industry Pipeline & Cable Locator, please read this handbook carefully.

Chapter Two

main function and characteristics of the Pipeline & Cable Locator

2.1 Main functions

1. Detect the underground cable and pipeline route
2. Measure the underground cable and pipeline depth
3. Determine the underground cable and pipeline insulation degree
4. Determine the route and depth of the cable and pipeline without touching the transmission signal

2.2 Main characteristics

- A. Use the newest integrated circuit and signal processing technology to achieve outstanding test performance
- B. The survey signal transmission includes:
 1. Direct Inject method: It has Injected the spot on the pipeline to survey the route and the burying depth, this method measuring accuracy is high, and jamming ability.
 2. Induction coupling method: In the railroad, the coal gas, the physical prospecting, the line cable and so on does not have to pour into the spot on the pipeline to survey the route and the

burying depth.

3.Inductive clamp method: As one of the important accessories, inductive clamp is used for inflicting the transmitter signals directly onto the objective pipelines.

C. many kinds of survey frequency: Has 480Hz, the 31KHz two kind of frequencies; The user may carry on the choice according to the environment (to need differently to survey frequency please to indicate specially in ordering contract).

D. enhancement test efficiency different localization pattern and function:

(1) peak value pattern: Determines the position through the maximum route signal.

(2) valley value pattern: Determines the position through the minimum route signal

(3) route direction detection: Direct-viewing, instructs the route rapidly the direction.

(4) current test (CM): find the goal pipeline by using test the current.

(5) stethoscope: fine the pipeline through stethoscope from the multitudinous pipelines .

E. auxiliary function:

(1) automatic control receive gain: The automatic control receiver gain causes the receiver to be at the optimized condition.

(2) sound function: The receiver reflects the survey intuitively through the tonality change the signal size.

(3) Pipeline state detection: when the transmitter in inject mode, first test the resistance of pipeline, the voltage, then send the signal to a pipeline. When the resistance too small (almost in short-circuits) the transmitter will withdraw from inject mode, when the voltage is so large the transmitter will warning, the operator must to stop the transmitter.

(4) battery test: Real-time detection of battery, when the voltage lower than the protect value ,the transmitter will automatic shut-down.

2.3 Technical specifications

2.3.1 Technical specification

2.3.1.1 Transmitter

Technical specification of Transmitter:

Signal frequency:

a.Inject method 480Hz, 31 KHz

b.Induct mode 31 KHz

c. Inductive clamp method 31 KHz

Output Pressure 0-400VP-P automatic/manual adjust due to the insulated instance

Output wave shape sine wave

Power source 11.1VDC 4.4AH Li-ion

Peak output power 10W

2.3.1.2 Receiver

Technical specification of Receiver:

Power loss	<1W
Power source	11.1VDC 1.8AH Li-ion
Biggest test burying depth	4.5 meters (normal condition)
The test burying depth error	$\leq 0.05H \pm 5\text{cm}$ ("H" is pipeline depth)
The test route error	$\leq 5\text{cm}$ (normal condition)
Test the route and the efficient depth with Inject method	$\geq 5\text{Km}$
	(normal condition)
Test the route and the efficient depth with Induct method	$\geq 3\text{Km}$
	(normal condition)

Note: The objective pipeline has no insulated failure or other interruption in the above-mentioned range in the normal condition.

2.3.2 Environmental request

Operating temperature	-20 °C ~ +50 °C
Storage temperature	-40 °C ~ +70 °C
Relative humidity	10%~90%
Atmospheric pressure	86~106KPa
Environment noise	$\leq 60\text{dB}$

2.3.3 Physical property

Pipeline & Cable Locator

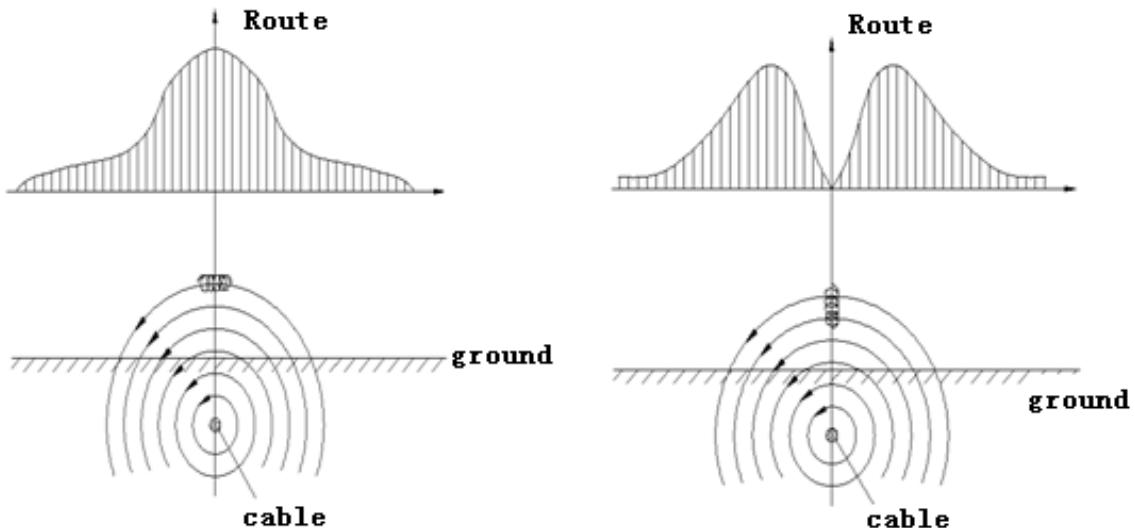
Name	Weight (Kg)	External Dimensions (mm)
Transmitter	3.4	348×239×175
Receiver	2.6	648×260×130
Entire machine (gross weight)	14	790×250×420

Chapter Three

The theory of the locator

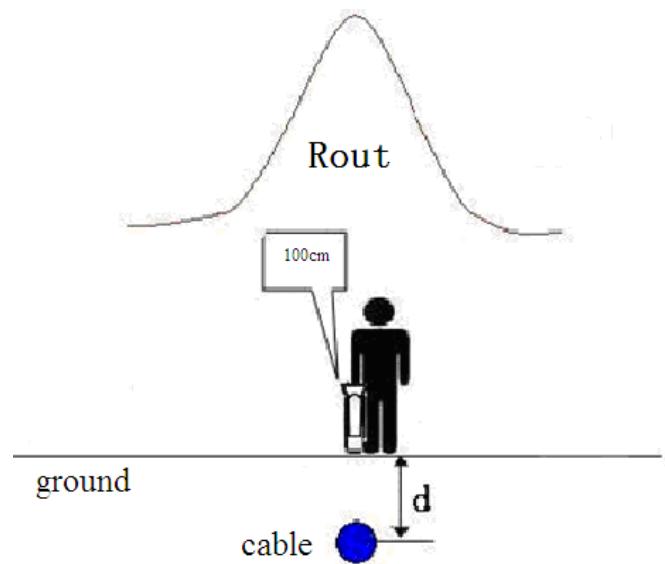
3.1 The locator electromagnetism theory and route search

When alternating current through a straight line conductor, it has a coaxial alternating current magnetic field around this conductor, puts a loop in this magnetic field, it will Induct the same frequency alternating current in the loop, the Induction tension size is decided by the position of this loop in magnetic field, when magnetic line direction is parallel to the loop, the loop Inducts the voltage horizontal ponderance is biggest, like the chart 3.1 left shows; When the loop is vertical to the magnetic line direction, the Induction voltage horizontal ponderance is smallest, like the chart 3.1 right shows. From this can judge the route of a cable.



3.1

3.2 Depth measure



3.2

There are two same horizontal loops laying in the receiver, the distance between them is known, sees chart 3.2, obtain the signal strength of the loop over the surveying route, according to the electromagnetic theory, may calculate the burying depth size of unknown goal pipeline conversely.

According to the Induction electricity faradism difference to calculate burying depth of pipeline.

Chapter Four

Before Use

4.1 Battery

When the power source is insufficient, charge cells or corresponding dry battery in time, to guarantee the enough electric power. Do pay attention to the polarity of the battery. The transmitter uses 11.1V 4.4AH Li-ion, and the receiver uses 11.1V Li-ion. You cannot charge over 8 hours.

4.2 Test

Every pipeline& cable locator has to be tested before leaving factory with eligible certificate.

4.2 When using the cell must have sufficient electricity, concrete operation methods as below:

- 4.2.1 Turns on the instrument to let the cell discharge until the cell symbolize on the menu into "X", at this moment the terminal voltage of cell is 11.1V. Attention: don't let the cell discharge excessively.
- 4.2.2 Meets the alternating current, at this moment the indicating lamp is not bright, then meet the cell, at this moment the green light is bright.
- 4.2.3 Insert the BNC of the charger into the BNC connector jack, the red light shines. When charging is over, the red light is bright.
- 4.2.4 Controls total duration of charging in 5 ~ 6 hours.
- 4.2.5 When charging, don't have to separate the alternating current or to insert and pull out the plug, otherwise must repeat 4.2.1 ~ 4.2.4 processes.

Before use the Pipeline & Cable Locator, please read this handbook.

The pipeline& cable locator TY-2000A packing list:

Transmitter	1 pc
Receiver	1 pc
Take-along bag	1 pc
User manual	1 pc
Transmitter charger	1 pc
Receiver charger	1 pc
Earthing stick	1 pc
Output line	1 pc
Inductive clamp	1 pc
Headphone	1 pc

Chapter five

Operation direction

5.1 Transmitter operations introduces

the transmitter kneading board chart:



5-1

The transmitter used the high performance microprocessor to carry on the control intuitively, the Chinese character demonstration contact surface, the operation convenient. Has the output signal intensity memory to maintain, pours into under the way the real-time monitor output current size function. Each time will press a key will lighten the back light, after 8 seconds automatic extinguishment, will save the battery energy.

5.1.1 key functions

 :Presses down this key, the power source connection, again presses for moment, power source shut down

: Signal trans start/stop

: Press to increase power output; largest to 100%

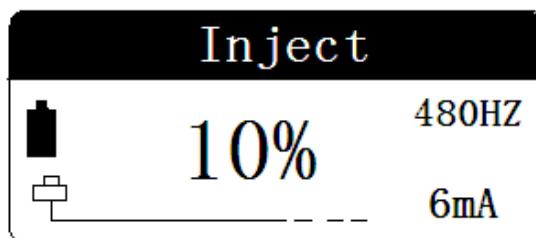
: Press to reduce power output ;Smallest to 0%

: push down the key change the signal frequency.

 : Uses in the selection signal load way: Pours into the way/induction way/pliers to clamp the way, the starting condition for pours into the pattern

5.1.2 display function

the figure of work on inject mode :



5-2

In which:

 : The current battery condition. When examines the battery voltage is lower than the protection value is the warning and the automatic close-down.

480Hz: the current frequency selected. You must draw from the transmit mode when change the frequency. the frequency defined the transmit mode you selected

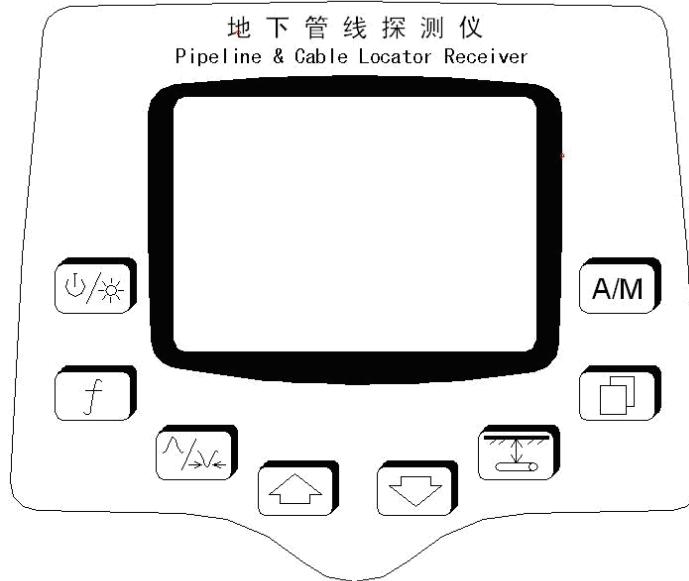
10%: signal output power. Through, regulate by  or . range from 0% to 100%.

6mA: the electric current size when on the inject mode . it will be reduced with the increase distance of the pipeline

: the condition of trans

5.2 Receiver operation

receiver Panel figure:



5-3

5.2.1 key functions

⊕/※: The power supply and light or off the display back light ,push the key for more then 3 seconds to shut down

↖/↘: The peak /valley value choice key, push the key to select the peak or valley mode

测量键: push down this key to measure the depth and the electric current.

↑: Gain increase key.

↓: Gain reduction key.

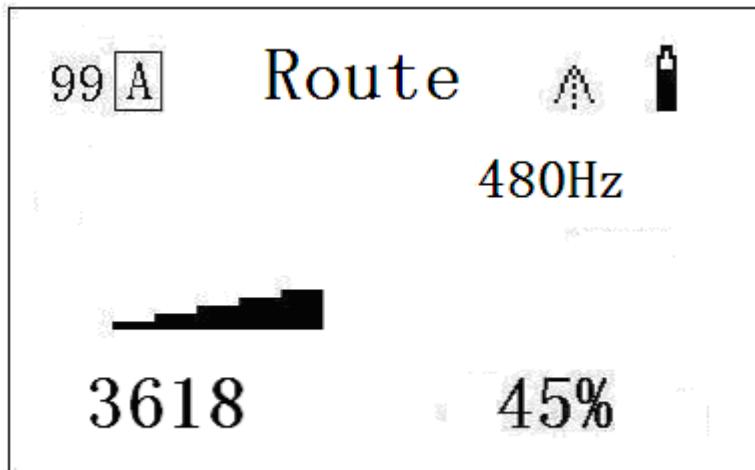
菜单键: Menu key. This menu contains the volume control, the stethoscope and electric current measure three function, use connect with **↑** and **↓**.

A/M: automatic or manual mode select key.

f : The frequency selection key, uses to select the frequency .

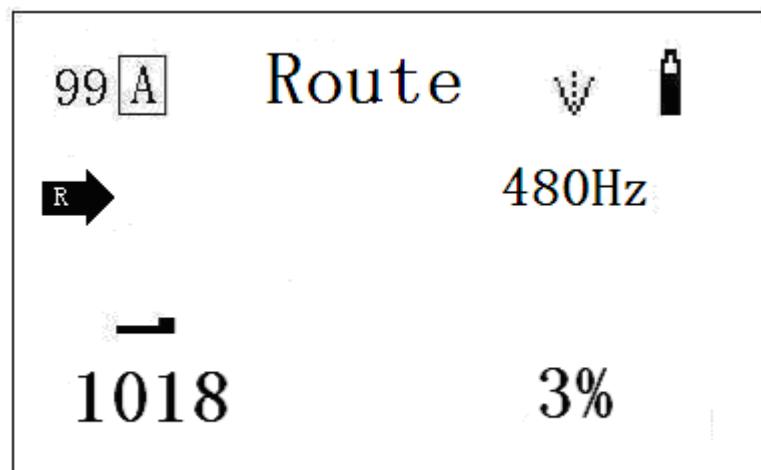
5.2.2 display function explanation

the figure of the display work on the peak mode :



5-4

the figure of the display work on the valley mode :



5-5

99: the relative gain of signal, from 1 to 99, presses / the key to change this value when work on manual mode.

A: the automatic measure mode , when presses / the key to enter the manual measure mode, the icon change to .

Route: Current route display condition, presses  key can measure the depth of pipeline.

: The peak mode, the route largest when upon the pipeline.when

presses the  key to change to the valley mode, the icon change to .

: The valley mode, the route turn to smallest when upon to the pipeline.

480Hz: the current frequency, press  key to change, they are 480Hz and 31KHz can be selected.

: the bar graph of the signal.

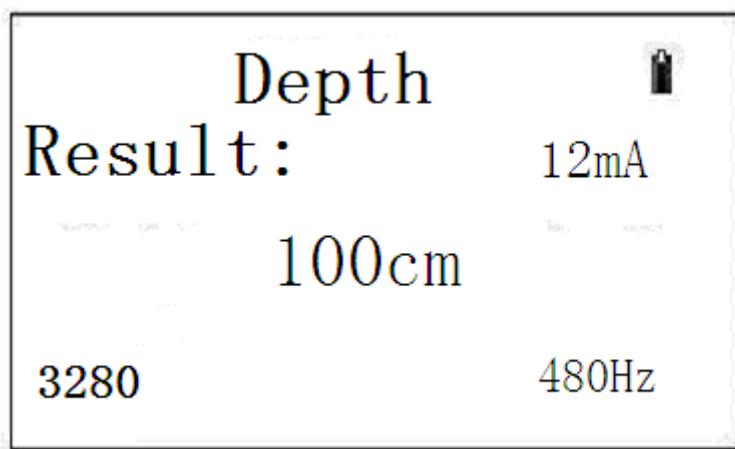
3618: the intensity of the route.

45%: the relative rate of the signal.

: The direction display, indicated the pipeline in arrow head right (left) side.

Attention: it do not work when far from the pipeline .

: The current battery condition. When examines the battery voltage is lower than the protection value is the warning and the automatic close-down.



5-6

In which:

100cm: the depth of pipeline; when press the route key back to peak mode condition

12mA: the value of electric current, measure the electric current of the pipeline.

480Hz: Current frequency

3280: the value of route

: the battery condition

chapter six

pipeline& cable locator

6.1 Simple pipeline& cable locator

6.1.1 Security

The safety comes first, don't neglect the security problem, and use the Pipeline & Cable Locator certainly to have to follow the strict standard.

When uses some special methods, for example sends the transmitter signal directly in the charged electric cable or poke probe in the pipeline with high pressure, only personnel who have certain qualifications can do.

The Pipeline & Cable Locator is usually used on the transportation busy road, so when using it, please be careful all the time and don't forget Safety Comes First.

Attention: The transmitter has high output pressure (may reach 500V), do not touch the wire which was stimulated!

6.1.2 choice transmitter signals

The operator must choose the technique to inflict best transmitter signal and the least coupling domino effect. Guaranteeing send enough track signals, use lowest signal to save cell power and reduce coupling effect.

Two ways of inflict transmitter signals in common use: direct connection and Induct divisor.

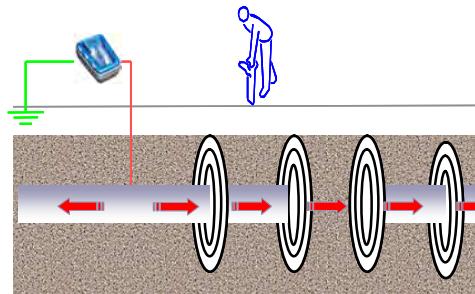
Whatever way to choose, you must assure that the objective pipelines can distribute a certain distant signal electric current loop, or the locator cannot detect the objective pipelines.

The transmitter can contact the capacitance. Earth the pipelines if it is necessary. Enter into the signal output estate automatically if there's no remain pressure on the pipelines, if there's high pressure, you will hear an alarm, meanwhile the measure will not continue, please measure again after finding out the causes.

Note: If the pipelines' which under the transmit point insulated block value is small (less than $1k\Omega$, or the measurement is 0Ω) or it is near the cable tie-in box, then the signal may leak or cannot bring Induct current. So you can properly move the transmitter to get the strongest Induct coupling signal.

6.1.3 Direct connect method

Direct connect method is fit for tracking the cables、water pipes and gas pipes distribute systems.



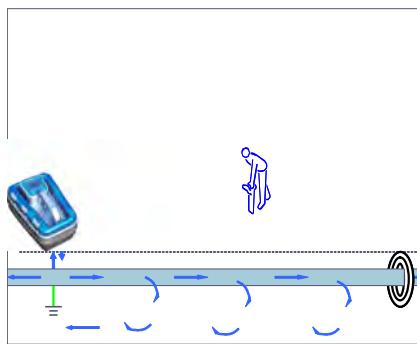
6.1

Link the connect cables to the transmitter output jack, one (red) line to the objective pipelines, eliminating the rust if it is necessary to guarantee good electric contact. Another (black) line link to the grounding point, it may be several meters distant from the objective pipelines, and had better be in a right angle with the possible route of the objective pipelines.

The transmitter LCD may show the value of the output electricity.

If the output electricity is too small, you must check the grounding situation of transmitter and the objective pipelines change the grounding position or water the dry sand if it is necessary.

6.1.4 Induct method



6.2

In the transmitter, there's a transmit loop, you can directly Induct the signals onto the pipelines under the transmitter, for the deeper objective pipelines, the efficiency is low, this method is usually used at the place where the depth is less than 2 meters.

What should be attention is the signal can not only Induct the objective pipelines, and also do to close-by pipelines. Don't use Induct method to inflict the signal to the well-insulated pipelines, unless the two ends of the pipelines can effectively ground.

Turn on the transmitter power supply, place the transmitter right over the pipelines, and make the transmitter in a line with the pipelines. And you can locate the pipeline at least 30 meters away from the transmitter.

Note: The transmitter will send radiation signal to the air and pipelines. So at a distance of the shooting near the local workstation machines, there might be some problems, in order to determine the receivers are positioning themselves rather than direct pipeline to receive a transmitter air signal to the transmitter side of the movement may be one or two-step, if the response from the receiver is moving to see pipelines, said receiver and the distance between the location of fire planes. Another method is to directly target transmitter receivers, the receivers then respond if the same or increase, said receiving the air signal receivers, such as the emergence of such a situation should be investigated to reduce transmitter power, and reduce the sensitivity receivers, receivers may need to be 50 meters away from the transmitter.

6.1.5 Inductive clamp

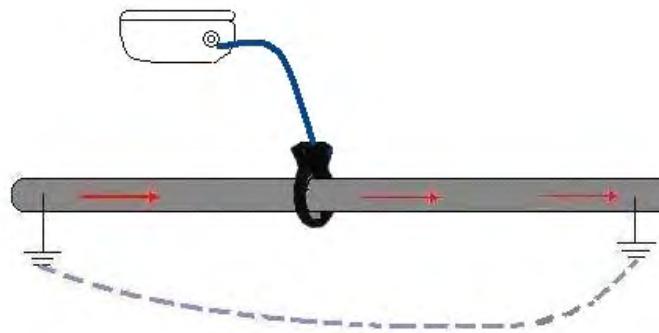
As one of the most important accessories, it can directly inflict the signal to the objective pipelines. Inductive clamp can inflict all kinds of signals safely with continuous power. Please attention; the transmission distance of Inductive clamp signal is nearer than that of directly link signal.

Insert the BNC of the Inductive clamp into the transmitter's output BNC connector jack. Hitch the pipelines with the Inductive clamp, make sure it's closed, and then open the transmitter, link well the pipelines so that the signal can be transmitted to the pipelines. It is normal that there's buzzer or shake, it doesn't do harm to the instrument. Don't touch the BNC when the Inductive clamp clamps the electric power cable.

Though the insulated cable has no real earthing point, as long as the pipeline buried a certain distance underground can support a capacitance coupling, it can track the insulated cable as well.

The transmitter cannot earthing when using the Inductive clamp to inflict signals.

In many instances, people always choose Inductive clamp method instead of direct link method, as the working mode of inductive clamp method is like the pipeline has already been slice off and link the transmitter to the two incisions.



6.3

6.1.6 Use the receiver to do orientation and orient the depth

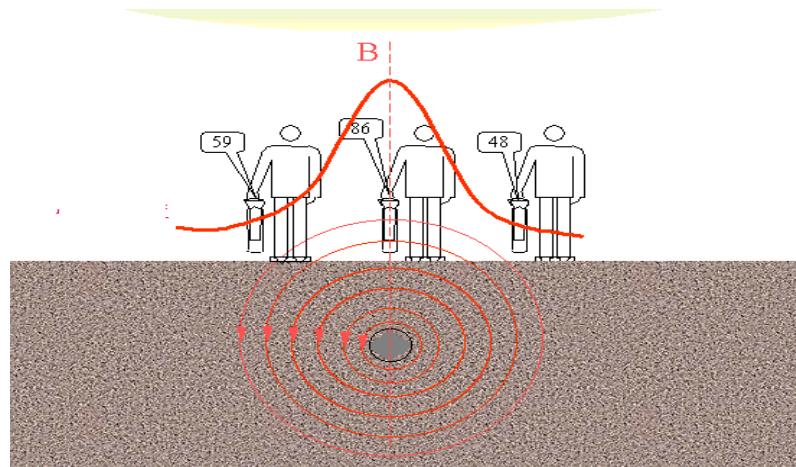
Since you successfully inflict the transmitter signal onto the objective pipelines, you can track and do orientation to the pipelines with the receiver. The position and the depth are the most important information of underground pipelines.

6.1.6.1 Peak Value Method

Peak levels in response to two days of receiving a target pipelines signal strength level, the antenna and top receiver antenna signal intensity for the poor response. Peak model is the top receivers in the target pipelines will be the largest (peak) response. Airframe associate transmitters receivers will face, made at the walk along the curve around, adjust sensitivity to the scale readings remain within. When peak response, local stop moving back and forth on both sides of the pipelines receiver to identify peak response. Then receiver local moves in the direction of maximum pause. Raising receiver lightly back and forth movement of the peak to determine the precise location of pipelines position in the target for the markings.

The precision and the ability to avoid disturbing of peak value method is much higher than the valley value method, it must be used in all kinds of works. The response when receiver is right

over the objective pipelines is zero (valley value).



6.4

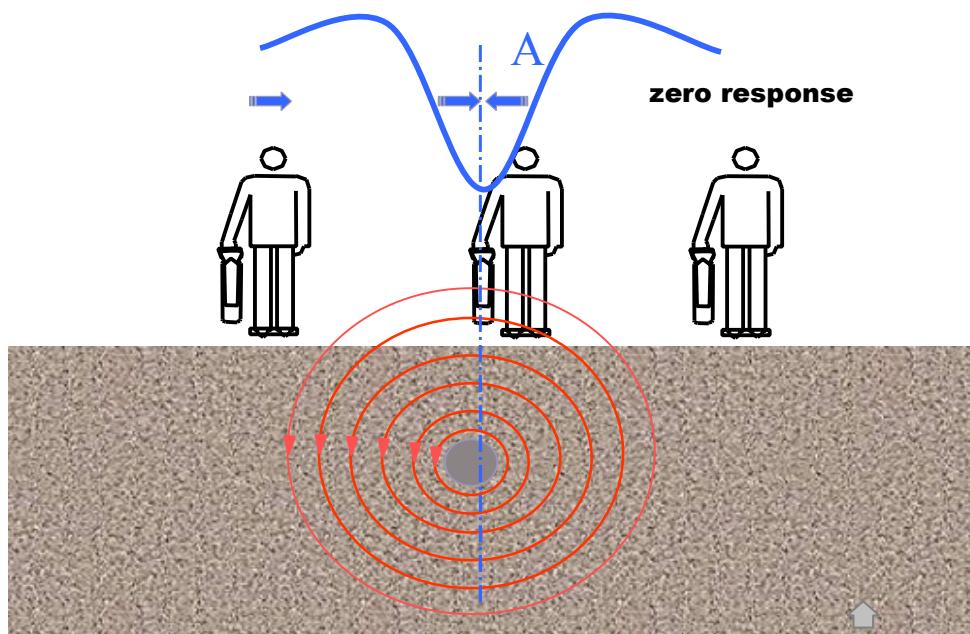
6.1.6.2 Valley Value Method

The valley value method is quick but the precision is bad, it mainly uses to track the pipelines and check the correctness of peak value method orientation.

Tune the receiver to the peak value response to speed up tracking the pipelines; you can hold the receiver at any trend, because the valley value response doesn't rest on the orientation of the pipelines. When you walk along the pipeline, you may move the receiver left and right, and observe the valley value response right over and two sides of the pipeline. When you use valley value response mode, and as the receiver is in a right angle with the cables, the LCD may show the left/right arrowhead to the pipeline position.

Tune back to the peak value response mode periodically so as to check the exact position of the objective pipelines.

Use peak value mode to do orientation and mark it. And then tune back to the valley value response mode, note down the valley value response position, if they are accordant, it can be considered pinpoint. If they are not accordant, then it should be not pinpoint. Attention, the two signs are at the same side of the objective pipeline, the fact position of the objective pipelines is near the position of the peak value response.



6.5

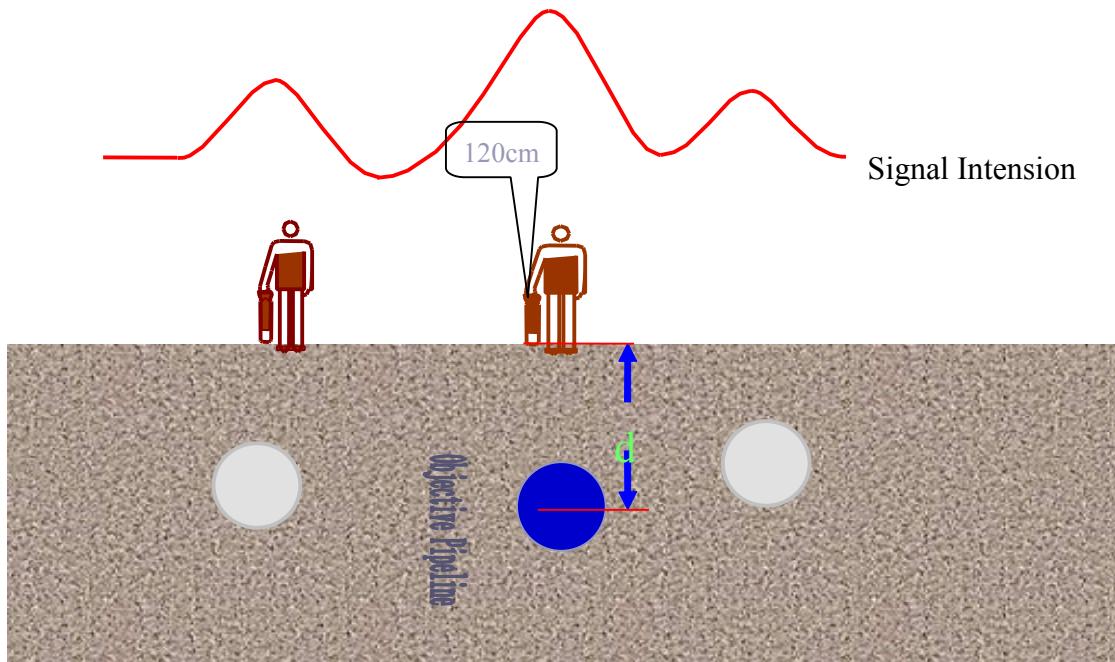
6.1.7 Depth measure

As long as inflicting the transmitter signal onto the pipelines, you can do depth measure to objective pipelines. Pay attention to the proceedings hereinafter in operating:

1. Do depth measure in the middle part of the pipeline, the depth of detecting must be within the depth-detect extension. It's the sticking point for big-diameter pipelines.
2. Don't do depth measure at the pipeline crook or nearby the T shape branch pipe, you can get best precision measure 10 meters depart from the pipeline.
3. The depth measure is unfaithful when there's intensive interfere or the transmitter signal has already been coupling on the close-by pipelines.
4. Avoiding inflict signals using Induct divisor in depth measure, if you have no alternative, the transmitter must leave 30meters away from the depth measure point.
5. If the transmitter signal is transmit to the near-by pipelines, you should inflict the signals onto the objective pipelines by both sides connect method.
6. Two measure ways: speediness measure and precision measure, press “depth” two times to enter precision measure. Direct reading divisor is in common use.
7. When detecting depth, the signal value should be over 3000, and the value fluctuate is small.

a、Direct reading method

It can do depth measure of 4.5 meters. It's simple and convenient, the precision measure is high when there's no interfere. But it has the shortcoming of a sort of anti-jamming ability.



6.6

First, use the transmitter to do orientation for the response of the objective pipeline peak value and peak valley. If the two positions are differ, it shows that the interfere exits, you may try again by inflicting transmitter signals to eliminate the needless signals, and do depth measure at the place where the response of two signals are accordant.

Place the receiver right over the pipeline and the machine's surface must be in a right angle with the pipelines and the ground, adjusting the sensitivity to make sure that the number is within the measure range. Press “depth” to show the depth, press again to return to the former mode.

If it turns out a strong radiate place, then there may be a radio station, meanwhile, you may measure the depth by making the antenna 5cm higher than the ground, detract 5cm from the depth shown to know the pipeline's depth.

If you doubt about the result, you may check again by making the receiver 50cm higher than the ground, if the result raise 50cm, it proves the former result right.

The depth measure precision can reach 5% if the situation is proper. But, the operator is impossible to know whether the situation is proper or not. So, we must adopt some techniques as follows to check some key reading.

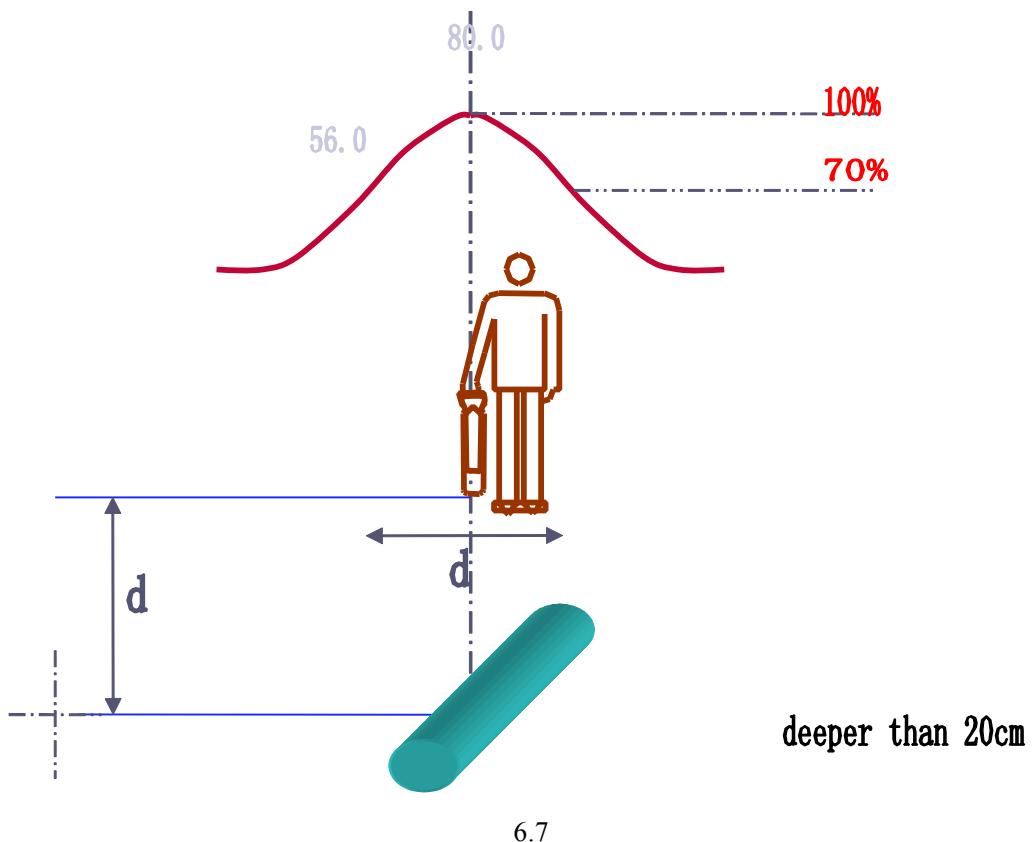
Is the pipeline route straight? At least it must be straight in 5 meters at the both sides of the measure point. Is the signal stabilizing in 10 meters? If it is stabilizing, you may do depth measure at the former measure point.

Check whether there is a close-by pipeline with strong signals at the distance of 3 or 4 meters to the objective pipelines. It is the ordinary and most serious cause of error in depth measure. The strong signal of close-by pipelines may cause 50% error.

To do depth measure a little far away from the pipeline orientation points, the smallest is the most pinpoint one.

b、70% method

If you have doubt in the result of direct depth measure, you can use 70% method to check. this kind of measure is efficiency because it adopts reading several different points to do depth measure.



When the receiver is right over the pipeline, make the reading a proper number while the receiver is in a right angle with the ground, and then move the receiver left and right to decline the reading to 70% of the value. Mark the two points and measure the distance. The distance is right the depth of the pipeline.

Note: Do not use this method when the depth is less than 20cm.

If the results of the two-depth measure are close, it turns out that the precision of the depth measure is guaranteed.

70% method is widely adopted by the professional pipeline detect companies for its high precision of depth measure and efficiency in anti-jamming.

6.1.8 Fieldwork procedure

The pipeline& cable locator can do orientation for all the metal pipelines and cables of the extent. So all the information about the depth and positions of pipelines are helpful for designing new pipeline pave project.

6.1.8.1 Preparation

Work over the locale before operating the pipeline& cable locator. The well cover, street lights and all the signs refer to cable and pipes are considerable.

Make sure the extent, including the edge belt of it.

6.1.8.2 Gridding search

Park the transmitter on each point of the extent in reasonable alternation, do gridding research, in order to detect the ignored pipelines which detected by no-power research and other pipelines.

6.1.8.3 Track, orientation and depth measure

Inflicting the transmitter signals to the pipelines and the cables, this can be linked. For example: the container, the valve, the streetlights and so on, track the part out of the extent and mark it.

For the pipelines need to be identified, you can track them till the well cover, streetlight and so on, and then you can inflict the transmitter signals, back to the extent.

Do orientation and depth measure to all the key points and characteristic points of each

pipelines of the area, mark them and note the relevant pipeline information and detect results. And then coordinate the data to do the pipeline-distributing map.

6.1.9 subsidiary function

6.1.9.1 Headphone method:

It has a good effect to pipelines general cannot be recognized such as many parallel pipelines, aerial cable.

The headphone will get the biggest response intensity on the objective pipelines which have been inflicted transmitter signal.

When the direction of the arrowhead of headphone is parallel to the pipeline direction, the signal is the biggest. The other way round the signal is the smallest.

6.2 Special pipeline detection

6.2.1 T shape pipeline detection

As long as you had made tracks for the pipeline and marked, you can track again along the pipeline with the receiver, but this time you may track one-step distant from one side of the pipeline, which has already been tracked, and make the receiver run parallel with the pipeline. The locator cannot detect the signal send by the main pipeline (or the signal is little), but the response to the branch pipeline is in evidence.

The most reliable method for locating the pipeline is to inflict the transmitter signal to the end part of the branch pipeline. The signal streams from the branch pipeline to the main pipeline, and then streams between both sides of the main pipeline's double directions. The airframe surface is in a right angle with the main pipeline, you can track the signal along the main pipeline, the receiver will response to it as zero values (valley top) right over the tie-in of the T shape branch pipeline. The reverse position of the valley is the nicely place of the T shape branch pipeline's

tie-in.

6.2.2 Parallel pipelines detection

In pipeline detection, the parallel pipelines is the sort of universal instance, in the area where the pipelines are dense, the receiver may always receive the interfere signal from the close-by pipelines, it may brings us the difficulty in recognizing and tracking the objective pipelines, and effecting the precision of orientation and depth-fix. Therefore we must adopt some methods to the best of our abilities to minish the influence of the close-by parallel pipelines' coupling signal.

First, we'd better not use the Induct method in the area where the pipelines are dense, but to use the coupling ability of direct-join method to inflict transmitter signal. In such instance, we'd better use peak value response mode orientation, measuring the depth by 70% method, so as to reduce the windage.

In commonly instances, the response of the receiver to the objective pipeline should be bigger than it to the close-by pipeline; we can recognize and track the objective pipeline by the response of the receiver. But if the close-by pipeline is nearer to the ground surface, the receiver's response to the close-by pipelines will surpass it to the objective pipelines. We cannot recognize and track the objective pipeline only by the receiver's response, so we must use direct-join method.

6.3 Ordinary instances in detection

6.3.1 Track the cables from tie-in or connection box

Before inflicting transmitter signal, it is necessary to take the common tie-in apart, in order to track the objective pipeline. If you want to track all cables start from the connection box, you may operate the transmitter at the Induct mode, put the transmitter by one side of the connection box in line with the cables tracked.

6.3.2 Long-distance cable track

In order to transmit the transmitter signal long enough distance, it is necessary to take the

earth connection of the cable off. When the tie-in or connection be earthed because of the safety or the prevent thunder protection, electric emerge (avoid overloading) discharge ware is used to replace the earthing of the tie-in or connection so as to protect the cables, making the uninterrupted orientation possible.

6.3.3 Tie-in pinnacle pulse

Most cable tie-in or connection may produce a pinnacle pulse at the response to the receiver, working experience and the realization of local situations are helpful for the operator to distinguish whether the pinnacle pulse figures that there's a connection box.

6.3.4 Metal fence

The cables usually burying under the ground of the outside of the metal protect fence of the highroad, the signal will coupling to the stretch metal protective fence. It is difficult to track for the metal protective fence is near from the transmitter under layer antenna. Taking up the receiver and hold the under layer antenna parallel with the metal protective fence, overcoming this difficulty is easy.

6.3.5 Street lighting cables

The transmitter signal is always connected to the metal pillar. If it is cement lamp standard—unless the lighting cables can be grounded via connecting to the examine and repair shelf, or you need to connect the transmitter signal with the lighting cables' metal shield. Knowing the relevant position and depth of the lighting cables (along with the other street establishment of the same lighting system) is quite helpful for tracking lighting cables, one connect point may inflict signals to the cables of a large piece of area.

It is viable to inflict signals to other electric power cables by using lamp standard, but the signal may be very little, for it maybe had transmitted for a long distance before it returned to the transformer substation, and it must stream again from the system. Here we can adjust the transmitter to high output power mode and tune up the output power. This method is viable for the

cables which are not convenient or difficult to inflict signals to locate.

As for the cables taking part from the wooden telegraph pole, cement telegraph pole or the lighting pillar, you can operate the transmitter at the Induct mode, and put it alongside the pillar, which is in a right angle with the ground to inflict signals.

6.3.6 Track metal gas pipe

Generate pipeline orientation and track technique can be used to detect the steeliness gas pipe.

Some gas pipes have insulative tie-in, to offer the inner house an effective earth loop.

Locating the gas pipe under or roadside of the highroad, you can use single end connect method to connect the transmitter to the valve, and connect the earthing cables to the valve box's metal shelf, guaranteeing to nip the line nip well, can offer well electric connection. You may brush and scrape the oil paint or the rust before connecting if it is necessary.

Sometimes one section of the pipeline may has some insulated tie-in, you should inflict the transmitter signal to the far-forth end of every insulated tie-in, and the higher signal frequency should be adopted. There maybe the tie-in can hardly let the signal go through in some other iron pipes, you may track the iron pipes in Induct way, and move the transmitter to the position last detect the signal.

Brand together the techniques as above; you can track the iron pipelines triumphantly commonly.

If all the tie-in of the metal pipelines are insulative, you cannot locate it by generate method, one way is to use extend-in method to locate the pipeline tie-in, that is extend the transmitter's forepart into the pipeline, in order to locate the pipeline tie-in, and then make the transmitter perpendicular to the pipeline, searching apex and valley response at every tie-in to nicely locate to the pipe.

Chapter seven

Maintenance and Elimination for Common Malfunction

7.1 Check-up

Both the transmitter and receiver have rechargeable batteries inside; you must recharge it before using.

Note: There are two chargers—one for the transmitter, one for the receiver, the charging methods are due to the charger instruction.

7.2 Cleanness maintenance

If needs to remove the silt or dirt on the pipeline & cable locator, please use the sponge and tepid water, also may use the weak basicity soap to remove the stubborn dirt. Don't use any solvent to clean.

The Thrive Industry Pipeline & Cable Locator has certain rainproof function, but strictly prohibits immersing it in the water, does not guarantee the waterproof and leak-proof quality.

Do not deposit the instrument in the moist place, especially the place with caustic gas.

7.3 Elimination For common malfunction

Examine and Repair for the malfunction

Num.	malfunction	possibility	solution
1	No display with “du du” noise.	low cell	To measure the pressure of the charger receptacle with multimeter (prevents short circuit), if it is lower than 10.5V, it must be recharged.
2	The display is not clear when opening or during the operating process, the light is not enough or it does not work.	low cell	As above.
3	The value shown is on the low side when testing the route.	the signal is too feeble	Press 
		the signal isn't loaded.	Check the transmitter output line.
4	Operating with Induct method, can measure the signal distance from the transmitter within 50 meters, cannot measure the signal outta 50 meters.	The transmitter isn't placed over the pipeline. The transmitter isn't placed parallel to the pipeline.	The transmitter should be placed over the pipeline.
5	The receiver cannot receive signal when using immit method.	The transmit intensity isn't adjusted well.	To adjust to the proper transmit intensity.

6	As above.	The signal output pin doesn't stick in well.	Stick the pin well in.
7	When using Induct method or immit method, can hardly receive signal.	When signal outputting, when it displays or, you must get it recharged.	Use it after it has been fully recharged.

7.4 Maintain service

Thrive Industry can provide prompt and high quality service for the customer. When the instrument cannot work normally, make sure it is the problem of instrument itself first, then please promptly contact with the service center, and provides the instrument model, the serial number as well as the detailed accurate breakdown description. The engineer in the service center can provide some instructions and analyze the preliminary reason for the customer. If the question still could not be solved, please deliver the instrument to the service center to do repair.

All products and the accessories of our company had been well tested when designing, producing and before leaving factory, guaranteeing the trustiness of the performance and the choiceness of the quality. If you have any problem in operating, please first consult this user manual. If you need more consultation, please contact the after service department.

7.5 After service promises.

Our products carry out maintaining for life, outer the maintaining period, you only have to pay for the cost charge. We respond to the clients' advices and problem to the product quality in 48 hours.